

Aswinkumar Varathakumaran

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Profile

Senior undergraduate focused on computer vision, generative modeling, and multimodal AI, with research experience in real-time perception systems, foundation model adaptation, and applied deep learning for high-impact visual understanding tasks.

Education

Vellore Institute of Technology

B.Tech in Computer Science with AI/ML Specialization — CGPA: 8.96

2022 – Present

Chennai, India

Delhi Public School

CBSE XII — 94.4%

2021 – 2022

Bangalore, India

Experience

Undergraduate Machine Learning TA 📄

July 2024 – Dec 2024

PI: Dr. Sajidha S A — VIT Chennai

- Assisted final year ML students with machine learning assignments, tutorials, and guided project workflows for hands-on learning.

Deffo Tech AI

Dec 2025 – Current

AIML Intern

- Working on India's first fully indigenous Large Language Model developed under the TamilAI project.

Publications

- Varathakumaran, A., & Paramanandham, N.** *Depth-Aware Instance Segmentation for Accurate Pothole Depth Estimation Using Monocular Depth Maps for Advanced Driver Assistance.* **International Journal of Pavement Engineering (IJPE).** (Under Review) 🐙 Code 📄 Paper
- Varathakumaran, A., & Paramanandham, N.** *ProRain: Rain-Adaptive Denoising and Vehicle Detection via MobileNet-UNet and Faster R-CNN.* **ICSINTESA 2025.** (Accepted) 🐙 Code 📄 Paper
- Varathakumaran, A., Jawahara, A., Mynampati, S.A., Sajidha, & Thaseen, S.** *PROXI-NAV: Proximity-Aware Navigation with Audio-Visual Sensing Intelligence.* **FTNCT'08.** (Under Review) 🐙 Code 📄 Paper
- Varathakumaran, A., Jawahar, A., & Pandiyaraju, V.** *CLAIMS: Clinical Labeling and Abnormality Inference from Multilead ECG using LLMs with Evidence Citation.* **ICACRS 2025.** (Under Review) 🐙 Code 📄 Paper

Projects

Basketball Player Tracking with Court Projection 🐙

May 2025

(YOLOv11, Streamlit, Docker, FastAPI)

- Developed a complete sports analytics pipeline using YOLOv11 trained on custom DeepSportRadar court and player annotations, enabling robust multi-player tracking under dynamic lighting and motion.
- Computed homography transformations to map broadcast-view detections onto a top-down court representation, enabling zone-based heatmaps, possession analytics, and trajectory inference.
- Built a Dockerized Streamlit-FastAPI deployment supporting live video ingestion, asynchronous inference, and real-time overlay rendering with sub-80ms latency per frame.

Space Agriculture Data Portal 🐙

Feb 2025

(NASA OSDR API, LangChain, Ollama, Streamlit)

- Developed a data exploration portal for NASA's Open Science Data Repository (OSDR), automating dataset retrieval, metadata parsing, preprocessing, and time-series visualization of microgravity plant-growth experiments.
- Integrated an LLM-powered query engine using LangChain + Ollama, enabling scientific question-answering grounded in experiment metadata, controlled vocabulary, and mission logs.
- Designed an interactive dashboard with modular visualizations (growth curves, environmental parameters, genotype comparisons) to support hypothesis formation for space agriculture research workflows.

Restaurant Feedback Classifier Agent

Dec 2024

(Whisper, PyTorch, HuggingFace, Transformers)

- Designed a CNN-BiLSTM architecture on Mel spectrograms to extract prosodic sentiment cues beyond linguistic content, enabling robust affective prediction.
- Integrated sentiment outputs with contextual LLM reasoning to generate concise, human-readable review summaries and restaurant scorecards.

Achievements

- Program Representative for **Computer Science AI&ML branch** at *VIT Chennai*.
- Top **10 Finalist** at *Hack The Horizon 2.0* — VIT Chennai AI Club's flagship *24-hour hackathon* with **200+ participants** from South India.
- Top **5 Finalist** in *Cosmonova*, a space-based research hackathon hosted by **SEDS Antariksh**.

Extracurriculars

- **Treasurer & Marketing Lead, Socrates Club - VIT** Aug 2023 – Present
Managed club finances, sponsorship acquisition, budgeting for events, directed promotional strategies, designed materials, and enhanced campus visibility.
- **Sophrosyne VIT, Toastmasters International** July 2024
Was part of the newsletter editorial team and organized public speaking workshops for 80+ participants.
- **Internshala Student Program (ISP) 2025** Mar 2025
Represented Internshala, promoting internships, trainings, and student engagement.
- **Marina Beach Cleanup** May 2024
Co-led 3 km cleanup with 15+ volunteers.
- **American Football Team — VIT Chennai** June 2023 – April 2024
Vice Captain, led a 15-member team to semi finals in a state level tournament.

Certifications

Oracle Cloud Infrastructure 2025 Generative AI Professional — <i>Oracle University</i>	June 2025
Neural Networks and Deep Learning — <i>DeepLearning.AI</i>	Aug 2025
Forge Industry Certification – Accenture Nordics — <i>Forage</i>	May 2024

Technical Skills

- **Languages:** Python, C/C++, Java, SQL, HTML/CSS, JavaScript
- **Frameworks:** PyTorch, TensorFlow, Streamlit, React, Next.js
- **Developer Tools:** Git, VSCode, CVAT, Roboflow, Docker
- **Libraries:** OpenCV, MediaPipe, HF Transformers, LangChain, pandas, NumPy
- **Vision Models:** YOLO, Detectron2, SAM, HRNet, MiDaS, ZoeDepth
- **Core:** Keypoints, Segmentation, Homography, Depth Estimation, Video Inference
- **NLP:** NER, Sentiment Analysis, Speech-to-Text, Text Generation
- **APIs & Data:** HF API, NASA OSDR API, REST APIs, SQLite3, MySQL